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September 1984

AN INVESTIGATION OF THE SPORT FISHERY ON DAUPHIN LAKE, MANITOBA, 1982

by

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ABSTRACT

Babaluk, J.A., B.M. Belcher, and J.S. Campbell. 1984. An investigation of the sport fishery on Dauphin Lake, Manitoba, 1982. Can. Manuscr. Rep. Fish. Aquat Sci. 1777: iv + 23 p.

A creel census, cottage residents' angling survey, and biological investigation were conducted during the period May 15 to September 17, 1982 at Dauphin Lake, Manitoba. An estimated 4 625 anglers spent a total of 12 383.9 hours angling. The catch was mainly northern pike, Esox lucius (Linnaeus), (78.1%) and walleye, Stizostedion vitreum vitreum (Mitchill), (17.6%). The overall angler success rate was 0.355 northern pike per angler hour and 0.080 walleye per angler hour although success varied at different locations on the lake and generally was highest in May and September. Anglers were mainly local residents (71.7%). Angling pressure and harvest by cottage residents was minimal. Overall, an estimated 4 392 northern pike weighing 3 957.1 kg and 988 walleye weighing 567.3 kg were removed from the lake. Angling pressure and harvest had declined markedly since a 1969 creel census.

Mean values for measurements of angled northern pike at Valley River were 524 mm in fork length, 952 g in round weight, and 6.0 yr in age. Mean values at Wilson River/Stoney Point were 530 mm, 977 g, and 6.0 yr. Mean values at Turtle River were 499 mm, 739 g, and 5.5 yr. Mean values at Crooked Creek were 478 mm, 700 g, and 5.5 yr. There were significant differences between locations. Mean values for measurements of angled walleye at Valley River were 379 mm in fork length, 675 g in round weight, and 3.7 yrs in age.

Creel census results indicate a decline of the walleye sport fishing harvest parallel to that of the commercial walleye harvest. The sport fishery should be investigated again to assess validity of 1982 results, changes in angling pressure, angler harvest, and biological characteristics of the fishery. A winter sport fishery survey should be undertaken to assess its impact on the fishery resources of the lake.

Key words: angling; angling statistics; catch composition; catch/effort; creel census; northern pike; walleye.

RESUME

Babaluk, J.A., B.M. Belcher, and J.S. Campbell. 1984. An investigation of the sport fishery on Dauphin Lake, Manitoba, 1982. Can. Manuscr. Rep. Fish. Aquat Sci. 1777: iv + 23 p.

Du 15 mai au 17 septembre 1982, au lac Dauphin (Manitoba), on a effectué un recensement des prises de la pêche à la ligne, un relevé des activités des habitants des chalets en matière de pêche, et une étude biologique. Selon les estimations, 4 625 pêcheurs ont consacré 12 383,9 heures à ce sport. Ils ont pris surtout des grands brochets, Esox Lucius (Linnaeus) (78,1%), et des dorés Stizostedion vitreum vitreum (Mitchill) (17,6%). Le taux de succès global était de 0,355 grand brochet par heure-pêcheur et de 0,080 doré par heure-pêcheur bien que ce taux de succès ait varié d'un endroit à l'autre du lac et ait généralement été plus élevé en mai et en septembre. La plupart des pêcheurs sportifs (71,7%) habitaient sur place. La popularité de la pêche, ses effets ainsi que les prises des habitants des chalets étaient peu importants. Dans l'ensemble, on estime qu'environ 4 392 grands brochets pesant 3 957,1 kg et 988 dorés pesant 567,3 kg ont été pêchés. La popularité de la pêche, ses effets et les prises ont diminué de façon remarquable depuis un recensement effectué en 1969.

En moyenne, les grands brochets pris dans la rivière Valley mesuraient 524 mm de long, pesaient 952 g (poids arrondi) et étaient âgés de 6 ans. A la rivière Wilson et à Stoney Point, ces moyennes étaient de 530 mm, 739 g et 6 ans. A la rivière Turtle, on obtenait des moyennes de 499 mm, 739 g et 5,5 ans, alors qu'elles devenaient de 478 mm, 700 g et 5,5 ans à la rivière Crooked. Il y avait une importante variation d'un endroit à un autre. Les valeurs moyennes des dorés pris à la ligne à la rivière Valley étaient de 379 mm, 675 g (valeur arrondie) et 3,7 ans.

Dans le cas du doré, le recensement indique une baisse des prises de la pêche sportive parallèle à celles de la pêche commerciale. Il faudrait procéder à une nouvelle étude de la pêche sportive pour évaluer la valeur des données de 1982 ainsi que les changements dans la popularité de la pêche à la ligne et ses effets, ainsi que dans les prises et les caractéristiques biologiques de la pêche. Il faudrait également faire une étude de la pêche sportive d'hiver pour en évaluer les effets sur la population de poissons du lac.

Mots-clés: pêche à la ligne; statistiques sur la pêche à la ligne; composition des prises; prise/effort; recensement des prises; grand brochet; doré.

INTRODUCTION

In 1982, a co-operative fisheries rehabilitation research program was initiated by the Canada Department of Fisheries and Oceans and the Manitoba Department of Natural Resources. The objective of this program is to develop new biological and hydrological techniques for the rehabilitation of declining recreational and commercial fisheries in the freshwaters of Canada. Emphasis is being placed on the rehabilitation of the walleye, Stizostedion vitreum vitreum (Mitchill), perhaps the most economically important freshwater fish species in Canada (Scott and Crossman 1973).

An example of the decline in the freshwaters fisheries of Canada is evident in the commercial walleye fishery in Manitoba, where the landed catch from 1973-1978 averaged 2.3 million kg per year; approximately 50% of the average annual production from 1945-1954. Dauphin Lake, Manitoba (51°17'N, 99°48'W) (Fig. 1, inset) was selected for a fisheries rehabilitation research program because it once was considered to have one of the most productive commercial fisheries in Manitoba; a fishery where more than 50% of the catch was made up of walleye (Cunningham 1935; Butler 1950, and H. Valiant, Manit. Dep. Nat. Resour. Dauphin, personal communication); and a fishery that has declined dramatically since the 1950's. During the 1950's the average annual walleye catch was approximately 50 000 kg while during the 1970's the harvest had declined to an average annual catch of 2 500 kg (Fig. 2). A remnant walleye stock is still present in the lake, and it is this stock that is the target of the rehabilitation program.

Collection of baseline data for the fisheries rehabilitation research program included a preliminary angler creel census, biological sampling of the angled catch, and a cottage residents' angling survey conducted at Dauphin Lake during the open water season of 1982. The purpose of collecting this information was to assess angling pressure and harvest; to evaluate tourist utilization of the Dauphin Lake sport fishery, and to describe briefly some of the biological characteristics of the angled catch. These results are presented in this report and are compared with data from a creel census conducted at Dauphin Lake by provincial authorities in 1969 (W. Howard, Manit. Dep. Nat. Resour. Brandon, personal communication) to determine whether there has been a decline in the sport fishery walleye harvest parallel to that experienced in the commercial walleye fishery.

MATERIALS AND METHODS

DESCRIPTION OF THE STUDY AREA

Dauphin Lake is a remnant of glacial Lake Agassiz located in the west central region of Manitoba. The lake is orientated in a north-northwest direction and is approximately 40 km long and 20 km across at its widest point. Dauphin Lake has a surface area of approximately 500 km^2, a mean depth of 2.1 m, and a maximum depth of 3.5 m. The drainage basin of the lake has an area of approximately 8 700 km^2 and is bounded by the Duck Mountains to the west and northwest, the Riding Mountains to the south and southwest, and the divide between Dauphin Lake and Lake Manitoba to the east. The drainage system includes a number of small rivers and streams that empty into the lake from the south and west (Fig. 1). The Mossy River, at the north end of the lake, is the only outlet stream. It flows in a northerly direction into Lake Winnipegosis.

The open water sport fishery on Dauphin Lake is confined mainly to the tributary rivers, river mouths, and lake shoreline. Very little angling takes place in the main body of the lake due to its large, open water nature (no sheltered bays or coves) and an acute shortage of adequate boat launching facilities.

CREEL CENSUS AND COTTAGE RESIDENTS' ANGLING SURVEY

The 1982 open water sport fishing season on Dauphin Lake commenced on May 15 and extended until approximately the first week of November when the rivers and lake started to freeze over. The creel census was conducted between May 15 and September 17. Relatively little angling was undertaken on Dauphin Lake from the end of the census period to freeze up (Valiant, personal communication).

Specific locations surveyed included the Valley, Turtle, Wilson, and Ochre rivers; Crooked Creek; Stoney Point; and Welcome and Methley beaches (Fig. 1). These locations were chosen because they are easily accessible to anglers and were reported to be popular angling sites (Valiant, personal communication). Howard (personal communication) suggested that the Mink and Mossy rivers were also major angling points, but area residents and periodic visits to these sites during the creel census period indicated otherwise. A location that was inadvertently excluded from the creel census was Christensen Beach, an area of new cottage development, located approximately 5 km north of Methley Beach. There are fewer than one dozen cottages located there, but the best boat launching facility on Dauphin Lake is situated there.

The creel census design was based on a statified random sampling design devised by Valiant and Smith (1979) whereby estimates of production and other parameters (number of angler hours, number of fish caught, etc.) could be measured with ±20% confidence limits. Each location was surveyed individually. That is, a separate sampling survey was designed and implemented for each location. Estimates of production and other parameters could, therefore, be obtained from each location and, by summation, for Dauphin Lake as a whole.

According to Valiant and Smith (1979) the total number of sampling days required to achieve ±20% confidence limits at each location should be determined from previous creel census information. Unfortunately, insufficient information was available from the 1969 Dauphin Lake creel census to make this determination.

Therefore, sampling intensities for locations in this census were based upon those outlined by Valiant and Smith (1979) for locations on Lake Winnipegosis, Lake Manitoba, and other bodies of water in west central Manitoba. At these lakes a sampling intensity of 25% of the total number of days in the creel census period was required to obtain ±20% confidence limits. For each of the Dauphin Lake locations an average of 32.6 sampling days (25.9%) was selected out of a possible 126 days in the whole sampling period (May 15 - September 17).

Each location was surveyed on a randomly selected set of days throughout the sampling period so that on each sampling day every angler was interviewed upon completion of angling. As a result, a complete daily count of a given fish species at a given location was obtained.

The stratification in the sampling design was included to account for predictable variance in fishing effort between weekend days and week days both within months and between months within the sampling period. In this creel census the sampling period was divided into ten strata (i.e. weekend days and week days over five months). In the anticipation that weekend days would produce more fish than week days, the weekend days were sampled more intensively (Table 1).

At each location on each sampling day the following creel census information was obtained from all anglers or angling groups: number of anglers in group, anglers' places of residence, number of hours spent angling, and the number of each fish species caught, released, and/or retained.

From the complete daily counts of the catch of a particular species and the actual number of hours expended angling at a given location during a given sampling day, average catches per day and daily angler hours were calculated. Mean catches per day and mean angler hours per day were multiplied by the total number of days in the sampling stratum to yield an estimate of totals for a given stratum at a given location. Totals for the whole creel census period for each location and for the whole lake were achieved by summation.

Approximately 95% (259 out of 274) of Dauphin Lake cottage owners were also surveyed in an attempt to assess, as closely as possible, their contribution to the total angler harvest. This group of potential anglers was treated separately because the cottage residents have private, individual access to the lake and probably would not have been interviewed at the creel census locations. Cottagers at Okra, Dauphin, Ochre, Lagoona, and Crescent Cove beaches (Fig. 1) received hand-delivered information packages containing angler survey forms and pre-addressed stamped envelopes. The cottagers were requested to supply the following information: number of anglers, number of hours spent angling, area of Dauphin Lake fished, and the numbers of each species caught and released or retained. The few cottagers at Stoney Point Beach did not receive the survey forms because they were included in the creel census at the Wilson River/Stoney Point location. Cottagers at Christensen Beach inadvertently were not delivered survey packages.

BIOLOGICAL INVESTIGATION

After obtaining the necessary creel census information, as many fish as time and angler permission would allow were sampled for species, fork length (mm), and round weight (g). When possible, sex was determined and the appropriate boney structures were obtained for age determination. However, because many anglers preferred to keep their catch intact, collection of structures for age determination and information on sex was limited.

When ageing structures were collected, operculi were taken from walleye and cleithra from northern pike, Esox lucius (Linnaeus). Walleye ages were determined as described by Le Cren (1947) and Campbell and Babaluk (1979). Northern pike ages were determined as described by Casselman (1974) and Harrison and Hadley (1979).

No biological data were collected from sauger, Stizostedion canadense canadense (Smith); goldeye, Hiodon alosoides (Rafinesque); yellow perch, Perca flavescens (Mitchill), or other species due to limited numbers caught.

The biological data collected from fish at the various creel census locations were analyzed in the same groupings as were employed for the creel census information.

The length-weight relationships for northern pike and walleye were described by the equation:

$$\log_{10} W = a + b\,(\log_{10} L);$$

where: W = round weight in grams
L = fork length in millimetres
a = Y - intercept
b = slope of the regression line

RESULTS AND DISCUSSION

CREEL CENSUS AND COTTAGE RESIDENTS' ANGLING SURVEY

Prior to the official opening of the angling season on Dauphin Lake there is a short but relatively intense dip net fishery for white sucker, Catostomus commersoni (Lacépède), and other "rough fish" on most of the rivers flowing into the lake. This fishery usually coincides with the spawning migrations of northern pike and walleye. Consequently, an unknown number of northern pike and walleye probably are removed prior to spawning each year.

The creel census data from the Valley River, Turtle River, and Crooked Creek were analyzed individually as relatively large numbers of fish were caught at these locations. Wilson River and Stoney Point data were grouped because of the close proximity of these two locations to

each other (approximately 4 km). Ochre River, Welcome Beach,and Methley Beach were treated as one location because of their relative lack of angler utilization. Estimated creel census results for the various census locations and for Dauphin Lake as a whole are summarized in Tables 2-7.

Angling pressure

The intensity and distribution of angler effort has changed substantially since 1969. A total of 1 444 anglers interviewed during the 1982 creel census period had accumulated 3 852.8 angler hours of fishing effort (2.7 hours per angler). The creel census sampling design provided from these data an estimate of 4 625 anglers who accumulated an estimated total of 12 283.9 angler hours of fishing effort during the census period (Table 2). This represents a dramatic decline from the estimated 18 000 anglers and 81 000 angler hours on Dauphin Lake during the 1969 creel census (Howard, personal communication).

Most of the angling on Dauphin Lake took place at Valley River (41.0%) and Wilson River/Stoney Point (34.8%) locations followed by Turtle River (14.9%), Crooked Creek (5.2%), and Ochre River/Welcome and Methley beaches (4.2%). The relative popularity of Valley River and Wilson River/Stoney Point locations was attributed to their proximity to the town of Dauphin with a population of 8 971 (Statistics Canada 1982); the largest population centre in the area. Both locations are within a one-half hour drive of the town. This distribution differs from that reported by Howard (personal communication) when, during the 1969 creel census, Turtle River was the location most utilized by anglers followed by Valley River, Wilson River/Stoney Point, Crooked Creek, and Ochre River/Welcome and Methley beaches, respectively.

Four hundred and fifty-one anglers interviewed at Valley River in 1982 had fished for 1 573.3 hours (3.5 hours per angler). Howard (personal communication) estimated fishing effort at 4-5 hours per angler throughout the summer of 1969 at Valley River. The 1982 census yielded an estimate of 1 453 anglers who fished for 5 071.8 hours during the census period (Table 3). Six hundred and fifteen anglers were interviewed at Wilson River/Stoney Point. These anglers had fished for a total of 1 368.0 hours (2.2 hours per angler). The census yielded an estimate of 1 940 anglers who fished for 4 307.7 hours (Table 4).

Angling effort at the other locations was relatively low. Two hundred and sixty-five anglers interviewed at the Turtle River location had fished for a total of 666.0 hours (2.5 hours per angler). Howard (personal communication) estimated a June, 1969 average of 6.2 hours per angler at this site. Our census estimated that 734 anglers utilized Turtle River for 1 843.5 hours during the 1982 census period (Table 5). Less fishing effort occurred at Crooked Creek and Ochre River/Welcome and Methley beaches locations. Ninety-six anglers interviewed at Crooked Creek during the census period accumulated 198.5 angler hours (2.1 hours per angler). An estimated 310 anglers used this location for a total of 640.9 hours (Table 6). Ochre River/Welcome and Methley beaches locations were the least utilized. Seventeen anglers interviewed at these locations had fished for 47.0 hours (2.8 hours per angler). Our census estimated that 188 anglers had fished for 520.0 hours (Table 7).

Cottage resident angling effort on Dauphin Lake was low compared to effort by anglers at the creel census locations. Only 30 of 259 questionnaires distributed to cottage residents were returned, and only nine respondents stated that they did any angling at all. These nine respondents, representing angling excursions by 46 individuals, reported a total catch of 105 northern pike, five walleye, and five yellow perch during the cottage season (approximately May 15 - September 7). The data obtained from the cottage survey was insufficient to calculate any meaningful effort or fish production information. It was assumed, therefore, that the summer cottage resident angling was relatively insignificant on Dauphin Lake.

The 1982 creel census revealed, as Howard (personal communication) had, that a large percentage (71.7%) of the 1 444 anglers interviewed on Dauphin Lake were local residents. Local resident was defined as one residing within approximately 80 km of Dauphin Lake. Other anglers interviewed came from other parts of Manitoba (16.4%), other parts of Canada (0.9%), the State of North Dakota (7.7%), and other U.S. states (3.3%) (Fig. 3A).

The Valley River demonstrated the most diversity in angler origin. Most of these anglers were local residents (47.5%), but 34.6% of all anglers interviewed at Valley River were Americans, the majority of whom (109 out of 156) came from North Dakota (Fig. 3B). A well established fishing and hunting lodge near the mouth of the Valley River and its reputation as a "good walleye river" account for the large numbers of non-resident anglers visiting the location. Other locations on the lake were frequented mainly by local residents. The frequency of local residents ranged from 63.8% at Turtle River to 90.4% at Wilson River/Stoney Point (Fig. 3C-F).

Angler harvest

An estimated 5 622 fish were removed from Dauphin Lake during the 1982 creel census period by an estimated 4 625 anglers in an estimated 12 383.9 hours. In comparison, Howard (personal communication) estimated that approximately 37 000 fish were angled from the lake between May and September, 1969.

The results of our creel census suggested that the sport fishery could be described as a northern pike/walleye fishery. The 1982 catch included an estimated 4 392 (78.1%) northern pike, 988 (17.6%) walleye, 183 (3.3%) yellow perch, 40 (0.7%) goldeye, and 19 (0.3%) sauger (Fig. 4A). The species composition of the angled catch differed at the various census locations. The Valley River catch was composed mainly of northern pike (64.1%) and walleye

(33.6%) (Fig. 4B). The Wilson River/Stoney Point catch was mainly northern pike (83.4%), yellow perch (8.8%), and walleye (7.2%) (Fig. 4D), while catches from Turtle River, Crooked Creek, and Ochre River/Welcome and Methley beaches were almost exclusively northern pike (96.5%, 100.0%, and 96.2%, respectively) (Fig. 4C, E, and F).

Angler catch/effort

There were substantial variations in the number of fish caught per angler hour depending on time of season and location. Numbers of fish caught per angler hour for each location and for the combined locations on the lake are summarized in Tables 2-7. Catches of northern pike, by far the major sport fish in Dauphin Lake, ranged from 0.077 per angler hour on August weekdays to 0.618 on May weekend days with a mean of 0.355 for the census period (Table 2). Angling success for northern pike generally peaked in May and early June at all individual locations (Tables 3 - 7). The maximum success rate was recorded at Crooked Creek where on May weekend days, anglers caught 1.176 fish per angler hour (Table 6). Angling success declined all over the lake as the season progressed so that by August at Crooked Creek, for example, no angling occurred. Northern pike catches were most consistent at Valley River throughout the season ranging from 0.116 fish per angler hour on July weekend days to 0.538 on May weekdays with a mean of 0.319 for the census period (Table 3). Mean angler catch per effort for northern pike from Dauphin Lake, combined locations, was compared with those from a number of other large lakes and rivers in western Canada (Table 8).

Walleye catches on the lake, as a whole, ranged from 0.026 fish per angler hour on July weekdays to 0.510 fish per angler hour on September weekdays with a mean catch per effort for the census period of 0.080 walleye per angler hour (Table 2). Colby et al. (1979) stated that a good walleye sport fishery existed when walleye were caught at a rate of 0.300 fish per hour when all species were fished for. Dauphin Lake does not have a good walleye sport fishery based upon this definition. Mean angler catch per effort for walleye from Dauphin Lake, combined locations, was compared with those from a number of other large lakes and rivers in western Canada (Table 8).

Most of the Dauphin Lake walleye catch was angled from Valley River. Of an estimated 988 walleye removed from the lake, 847 (85.7%) were caught at this location. The mean angler catch per effort at Valley River during the census period was 0.167 walleye per angler hour with a range of 0.040 fish per angler hour on June weekdays to 0.599 fish per angler hour on September weekdays (Table 3). Angling probably was relatively successful on September weekend days, but no creel census information was collected during those times.

Walleye angling success, generally, was very poor at other locations on Dauphin Lake. Some walleye were caught at Wilson River/Stoney Point, but the catch rate was extremely low (range = 0 - 0.132; mean = 0.029 per angler hour) (Table 4). Few walleye were caught at Turtle River and Ochre River/Welcome and Methley beaches locations (Tables 5 and 7), and none were angled at Crooked Creek (Table 6).

BIOLOGICAL INVESTIGATION

Size composition of the angled catch

A total of 136 northern pike were measured and weighed at the Wilson River/Stoney Point location. The sample had a mean fork length of 530 mm (Fig. 5) and a mean weight of 977 g (range = 140 - 4250 g). The 261 northern pike measured and weighed at the Valley River had a mean fork length of 524 mm (Fig. 6) and a mean weight of 952 g (range = 500 - 4780 g). One hundred and seventy-two angled northern pike measured and weighed at Turtle River had a mean fork length of 499 mm (Fig. 7) and a mean weight of 739 g (range = 400 - 1300 g). One hundred and forty northern pike were measured and weighed at Crooked Creek. This sample had a mean fork length of 478 mm (Fig. 8) and a mean weight of 700 g (range = 350 - 1250 g). No northern pike were measured and weighed at the Ochre River/Welcome and Methley beaches locations. Northern pike angled at census locations during the 1982 census period had significant differences in mean fork lengths (analysis of variance "F" test = 26.70, α=0.05, d.f.=3, 705). Duncan's test (α=0.05, d.f.=705) indicated no significant difference between Valley River and Wilson River/Stoney Point northern pike mean fork lengths, while there were significant differences between those of Crooked Creek and Valley River, Wilson River/Stoney Point, and Turtle River, and, also, between those of Turtle River and Valley River and Wilson River/Stoney Point.

Walleye were measured and weighed only at Valley River and Wilson River/Stoney Point locations. Insufficient numbers of walleye were angled at the other locations to make analysis of measurements and weights worthwhile. One hundred and eighty-one Valley River angled walleye had a mean fork length of 379 mm. There appeared to be two modal length groups in the angled catch. These were the 340-349 mm and 410-419 mm groups (Fig. 9). The mean weight of the angled walleye sample was 675 g (range = 300 - 2280 g). Because of the relatively small number (35) of walleye measured and weighed at the Wilson River/Stoney Point location, no length frequency distribution is shown, however, the sample had a mean fork length of 366 mm (range = 313 - 525 mm). Again, there was a tendency for two modal length groups (340-349 mm and 410-419 mm) in the sample.

Age composition of the angled catch

Ages were determined for 96 northern pike sampled at Wilson River/Stoney Point and 132 sampled at Valley River. Both samples had a mean age of 6.0 yr. Turtle River northern pike had a mean age of 5.5 yr (n=47), while northern pike angled at Crooked Creek had a mean age of 5.1 yr (n = 38). Age frequency distributions of northern pike angled at these creel census loca-

tions are shown in Fig. 10-13. Northern pike angled at census locations during the 1982 census period had significant differences in mean ages (analysis of variance "F" test = 6.56, α=0.05, d.f.=3, 309). Duncan's test (α= 0.05, d.f.=309) indicated significant differences between Crooked Creek and Valley River mean ages and Crooked Creek and Wilson River/Stoney Point mean ages, only.

Walleye caught at Valley River had a mean age of 3.7 yr (n=171). The majority of these walleye were 3 (67.3%) and 4 (22.8%) years old (Fig. 14). These age groups coincide with the two distinct modal length groups of 340-349 mm and 410-419 mm, respectively. The 35 walleye from the Wilson River/Stoney Point angled catch for which ages were determined had a mean age of 3.3 yr (range = 1-8 yr). This catch also was mostly 3 and 4 year olds.

Length-weight relationships

The fork length-round weight relationship for angled Dauphin Lake northern pike (combined locations) is described by the equation:

$\log_{10}W = -3.5537 + 2.3881\ (\log_{10}L)$; $r^2 = 0.7646$

The length-weight equations for angled northern pike from individual locations on Dauphin Lake are as follows:

Wilson River/Stoney Point
$\log_{10}W = -2.5645 + 2.0272\ (\log_{10}L)$; $r^2 = 0.6717$

Valley River
$\log_{10}W = -4.2094 + 2.6360\ (\log_{10}L)$; $r^2 = 0.8638$

Turtle River
$\log_{10}W = -3.3299 + 2.2948\ (\log_{10}L)$; $r^2 = 0.6603$

Crooked Creek
$\log_{10}W = -3.8175 + 2.4835\ (\log_{10}L)$; $r^2 = 0.8202$

The fork length-round weight relationship for angled Dauphin Lake walleye (combined locations) is described by the equation:

$\log_{10}W = -4.9259 + 2.9929\ (\log_{10}L)$; $r^2 = 0.9310$

The length-weight relationships for angled walleye from the two locations on Dauphin Lake, where significant numbers were caught, are as follows:

Valley River
$\log_{10}W = -4.8219 + 2.9539\ (\log_{10}L)$; $r^2 = 0.9290$

Wilson River/Stoney Point:
$\log_{10}W = -5.6734 + 3.2777\ (\log_{10}L)$; $r^2 = 0.9610$

Separate length-weight equations were not calculated for male and female northern pike or walleye for reasons previously outlined.

CONCLUSIONS AND RECOMMENDATIONS

Results of the 1982 investigation of the sport fishery on Dauphin Lake have indicated a decline in angling pressure and angler harvest relative to that of the 1969 creel census. There has also been a shift in angling location preference. In 1969 anglers on Dauphin Lake preferred Turtle River followed by Valley River and Wilson River/Stoney Point, respectively. In 1982 the order of preference was Valley River, Wilson River/Stoney Point and Turtle River. Both censuses indicated a northern pike/walleye sport fishery with northern pike the predominant sport fish species. Because of design differences between the creel census conducted in 1969 and the one conducted in 1982, another creel census and biological investigation should be undertaken to confirm the results of the 1982 creel census and to monitor changes in angling pressure, angler harvest, and biological characteristics of the sport fishery. Any further work on creel censuses on Dauphin Lake should incorporate Christensen Beach as a census location.

The decline in angler effort, angler success, and angler harvest, indicated by the 1969 and 1982 censuses, coincides with low numbers of walleye removed from the lake by the commercial fishery during those years. Although there were no angling surveys conducted on Dauphin Lake prior to 1969, local residents had indicated that angling for walleye, in particular, declined dramatically during the late 1950's and early 1960's. This coincided with the dramatic decline in the commercial walleye catch.

In order to confirm the minimal impact of angling by cottage residents on the Dauphin Lake sport fishery, as indicated by the 1982 cottage residents' angling survey, a follow-up cottage residents' survey should be undertaken in conjunction with any future creel census conducted.

In addition, an investigation of the reported active winter sport fishery on the lake (Valiant, personal communication) should be undertaken in the near future to assess the impact of this fisnery on the fishery resources of Dauphin Lake.

ACKNOWLEDGMENTS

The authors would like to thank all the anglers and cottagers who cooperated by providing information during the 1982 angling surveys on Dauphin Lake. H. Valiant made valuable recommendations for the design of the creel census. D. Hodgins, B. McIntyre, P. Komonko, G. Curry, and R. Hanson assisted in the collection of data. P. Wong drafted the figures, and G. Decterow typed the manuscript.

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REFERENCES

BOND, W.A., R.W. MOSHENKO, and G. LOW. 1978. An investigation of walleye, Stizostedion vitreum vitreum (Mitchill), from the sport fishery of the Hay River, Northwest Terri-

An Investigation of the Sport Fishery on Dauphin Lake, Manitoba, 1982

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tories, 1975. Can. Fish. Mar. Serv. Manuscr. Rep. 1449: v + 19 p.

BUTLER, G.E. 1950. The lakes and lake fisheries of Manitoba. Trans. Am. Fish. Soc. 79: 18-29.

CAMPBELL, J.S., and J.A. BABALUK. 1979. Age determination of walleye, Stizostedion vitreum vitreum (Mitchill), based on eight different structures. Can. Fish. Mar. Serv. Tech. Rep. 849: iv + 21 p.

CASSELMAN, J.M. 1974. Analysis of hard tissue of pike Esox lucius L. with special reference to age and growth, p. 13-27. In T.B. Bagenal (ed.) The ageing of fish - the proceedings of an international symposium. Unwin Brothers, Surrey, England.

COLBY, P.J., R.E. McNICOL, and R.A. RYDER. 1979. Synopsis of biological data on the walleye, Stizostedion vitreum vitreum (Mitchill 1818). FAO Fish. Synop. 119: 139 p.

CUNNINGHAM, A.G. 1935. Remarkable productivity of Lake Dauphin. Trans. Am. Fish. Soc. 65: 275-276.

FALK, M.R., D.V. GILLMAN, and C.J. READ. 1980. The walleye, Stizostedion vitreum (Mitchill), sport fishery on Mosquito Creek, Northwest Territories, 1973-78. Can. Manuscr. Rep. Fish. Aquat. Sci. 1559: v + 29 p.

HARRISON, E.J., and W.F. HADLEY. 1979. A comparison of the use of cleithra to the use of scales for age and growth studies. Trans. Am. Fish. Soc. 108: 452-456.

LE CREN, E.D. 1947. The determination of the age and growth of the perch (Perca fluviatilis) from the opercular bone. J. Anim. Ecol. 16: 188-204.

SCOTT, W.B., and E.J. CROSSMAN. 1973 (1979). Freshwater fishes of Canada (revised printing). Bull. Fish. Res. Board Can. 184: 966 p.

STATISTICS CANADA. 1982. 1981 census of Canada, population geographic distributions for Manitoba. Supply and Services Canada. Cat. No. 93-907.

VALIANT, H., and T. SMITH. 1979. Angler creel census in the Lake Winnipegosis, Waterhen, Lake Manitoba and Dauphin River areas in 1977 and 1978. Manit. Dep. Nat. Resour. MS. Rep. 79-68: 88 p.

Table 1. Number of days sampled in each stratum at each location, Dauphin Lake, 1982.

Location	May 15-31		June		July		August		Sept. 1-17		Total
	WE[a]	WD[b]	WE	WD	WE	WD	WE	WD	WE	WD	
Valley River	4	2	4	4	4	4	4	4	0	4	34
Turtle River	4	2	4	4	4	4	4	4	1	2	33
Wilson River/ Stoney Point	4	3	4	5	4	4	4	4	0	2	34
Crooked Creek	5	1	2	2	2	2	2	2	1	2	21
Ochre River/ Welcome and Methley beaches	2	2	5	6	6	6	6	5	1	2	41

a = weekend day; b = week day

Table 2. Summary of estimated creel census results for Dauphin Lake (combined locations), 1982.

Sample Stratum	Total No. of Angler Hours	Walleye			Northern Pike			Yellow Perch			Sauger			Goldeye		
		No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour
May Weekends	2 650.4	142	67.5	0.054	1 637	1 534.7	0.618	14	3.7	0.005	0	-	-	0	-	-
May Weekdays	1 290.8	200	108.7	0.155	657	573.3	0.509	15	2.7	0.012	0	-	-	0	-	-
June Weekends	1 685.0	146	72.1	0.087	548	488.7	0.325	42	7.3	0.025	4	1.2	0.002	6	1.9	0.004
June Weekdays	3 405.6	113	57.1	0.033	1 038	904.7	0.305	50	9.0	0.015	0	-	-	0	-	-
July Weekends	957.7	76	50.5	0.079	143	142.3	0.149	3	0.6	0.003	4	1.5	0.004	13	4.3	0.014
July Weekdays	1 175.0	31	17.5	0.026	214	181.6	0.182	53	9.3	0.045	0	-	-	21	6.5	0.018
Aug. Weekends	350.3	54	36.5	0.154	61	57.8	0.174	0	-	-	0	-	-	0	-	-
Aug. Weekdays	426.3	0	-	-	33	31.4	0.077	0	-	-	11	3.4	0.026	0	-	-
Sept.Weekends	Incomplete data collected															
Sept.Weekdays	442.8	226	157.4	0.510	61	42.6	0.138	6	1.2	0.014	0	-	-	0	-	-
Totals	12 383.9	988	567.3	0.080	4 392	3 957.1	0.355	183	33.8	0.015	19	6.1	0.002	40	12.7	0.003

Table 3. Summary of estimated creel census results for Valley River, 1982.

Sample Stratum	Total No. of Angler Hours	Walleye			Northern Pike			Yellow Perch			Sauger			Goldeye		
		No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour
May Weekends	949.4	138	65.7	0.145	396	422.7	0.416	5	1.2	0.005	0	-	-	0	-	-
May Weekdays	390.0	180	95.5	0.462	210	176.2	0.538	0	-	-	0	-	-	0	-	-
June Weekends	530.0	98	49.1	0.185	102	88.6	0.192	0	-	-	2	0.6	0.004	0	-	-
June Weekdays	1 765.5	72	33.9	0.040	682	585.4	0.386	0	-	-	0	-	-	0	-	-
July Weekends	575.0	76	50.5	0.132	67	63.4	0.116	0	-	-	4	1.5	0.007	10	3.3	0.017
July Weekdays	175.0	21	14.2	0.120	21	20.0	0.120	0	-	-	0	-	-	21	6.5	0.120
Aug. Weekends	213.8	36	24.3	0.168	50	47.0	0.232	0	-	-	0	-	-	0	-	-
Aug. Weekdays	96.3	0	-	-	33	31.4	0.342	0	-	-	11	3.4	0.114	0	-	-
Sept.Weekends	No data collected															
Sept.Weekdays	376.8	226	157.4	0.599	55	36.7	0.146	6	1.2	0.146	0	-	-	0	-	-
Totals	5 071.8	847	490.6	0.167	1 616	1 471.4	0.319	11	2.4	0.002	17	5.5	0.003	31	9.8	0.006

Table 4. Summary of estimated creel census results for Wilson River/Stoney Point, 1982.

Sample Stratum	Total No. of Angler Hours	Walleye			Northern Pike			Yellow Perch			Sauger			Goldeye		
		No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour
May Weekends	944.1	4	1.8	0.004	646	684.8	0.684	4	1.0	0.004	0	-	-	0	-	-
May Weekdays	405.8	20	13.2	0.049	227	226.0	0.559	10	1.6	0.025	0	-	-	0	-	-
June Weekends	746.0	48	23.0	0.064	296	290.7	0.397	40	6.8	0.054	2	0.6	0.003	6	1.9	0.008
June Weekdays	1 046.1	35	20.3	0.033	224	209.2	0.215	44	7.5	0.042	0	-	-	0	-	-
July Weekends	121.7	0	-	-	23	22.9	0.189	3	0.6	0.025	0	-	-	3	1.0	0.025
July Weekdays	577.5	0	-	-	21	20.6	0.036	53	9.3	0.092	0	-	-	0	-	-
Aug. Weekends	136.5	18	12.2	0.132	11	10.8	0.081	0	-	-	0	-	-	0	-	-
Aug. Weekdays	264.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept.Weekends	No data collected															
Sept.Weekdays	66.0	0	-	-	6	5.9	0.083	0	-	-	0	-	-	0	-	-
Totals	4 307.7	125	70.5	0.029	1 454	1 470.9	0.338	154	26.8	0.036	2	0.6	<0.001	9	2.9	0.002

Table 5. Summary of estimated creel census results for Turtle River, 1982.

Sample Stratum	Total No. of Angler Hours	Walleye			Northern Pike			Yellow Perch			Sauger			Goldeye		
		No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour
May Weekends	511.0	0	-	-	341	247.2	0.668	5	1.5	0.010	0	-	-	0	-	-
May Weekdays	225.0	0	-	-	160	124.8	0.627	5	1.1	0.020	0	-	-	0	-	-
June Weekends	377.0	0	-	-	70	57.7	0.186	2	0.5	0.005	0	-	-	0	-	-
June Weekdays	352.0	6	2.9	0.016	22	16.3	0.063	6	1.5	0.016	0	-	-	0	-	-
July Weekends	200.0	0	-	-	53	56.0	0.267	0	-	-	0	-	-	0	-	-
July Weekdays	178.5	0	-	-	21	15.5	0.118	0	-	-	0	-	-	0	-	-
Aug. Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Aug. Weekdays	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept.Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept.Weekdays	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Totals	1 843.5	6	2.9	0.003	667	517.5	0.362	18	4.6	0.010	0	-	-	0	-	-

Table 6. Summary of estimated creel census results for Crooked Creek, 1982.

Sample Stratum	Total No. of Angler Hours	Walleye			Northern Pike			Yellow Perch			Sauger			Goldeye		
		No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour
May Weekends	203.9	0	-	-	240	168.1	1.176	0	-	-	0	-	-	0	-	-
May Weekdays	270.0	0	-	-	60	46.3	0.222	0	-	-	0	-	-	0	-	-
June Weekends	32.0	0	-	-	80	51.7	2.500	0	-	-	0	-	-	0	-	-
June Weekdays	11.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
July Weekends	40.0	0	-	-	21	14.7	0.250	0	-	-	0	-	-	0	-	-
July Weekdays	84.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Aug. Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Aug. Weekdays	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept. Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept. Weekdays	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Totals	640.9	0	-	-	401	280.8	0.626	0	-	-	0	-	-	0	-	-

Table 7. Summary of estimated creel census results for Ochre River/Welcome and Methley beaches, 1982.

Sample Stratum	Total No. of Angler Hours	Walleye			Northern Pike			Yellow Perch			Sauger			Goldeye		
		No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour	No.	Weight (kg)	No./ angler hour
May Weekends	42.0	0	-	-	14	11.9	0.333	0	-	-	0	-	-	0	-	-
May Weekdays	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
June Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
June Weekdays	231.0	0	-	-	110	93.8	0.476	0	-	-	0	-	-	0	-	-
July Weekends	21.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
July Weekdays	160.0	10	3.3	0.063	130	110.8	0.813	0	-	-	0	-	-	0	-	-
Aug. Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Aug. Weekdays	66.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept. Weekends	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Sept. Weekdays	0.0	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Totals	520.0	10	3.3	0.019	254	216.5	0.488	0	-	-	0	-	-	0	-	-

Table 8. Comparison of angler catch/effort in some large lakes and rivers in western Canada.

Location	Year	Number Caught/Angler Hour		Source
		Northern Pike	Walleye	
Dauphin Lake, Manitoba	1982	0.355	0.080	---
Lake Winnipegosis, Manitoba	1977	0.120	0.280	Valiant and Smith (1979)
Lake Manitoba (except Narrows), Manitoba	1977	0.170	0.320	Valiant and Smith (1979)
Delaronde Lake, Saskatchewan	1981	0.672	0.044	Tinline and Chen* (personal communication)
Great Slave Lake (Hay River), Northwest Territories	1975	0.039	1.290	Bond et al. (1978)
Great Slave Lake (Mosquito Creek), Northwest Territories	1973-1978	-	1.700	Falk et al. (1980)

* Saskatchewan Department of Tourism and Renewable Resources, Saskatoon.

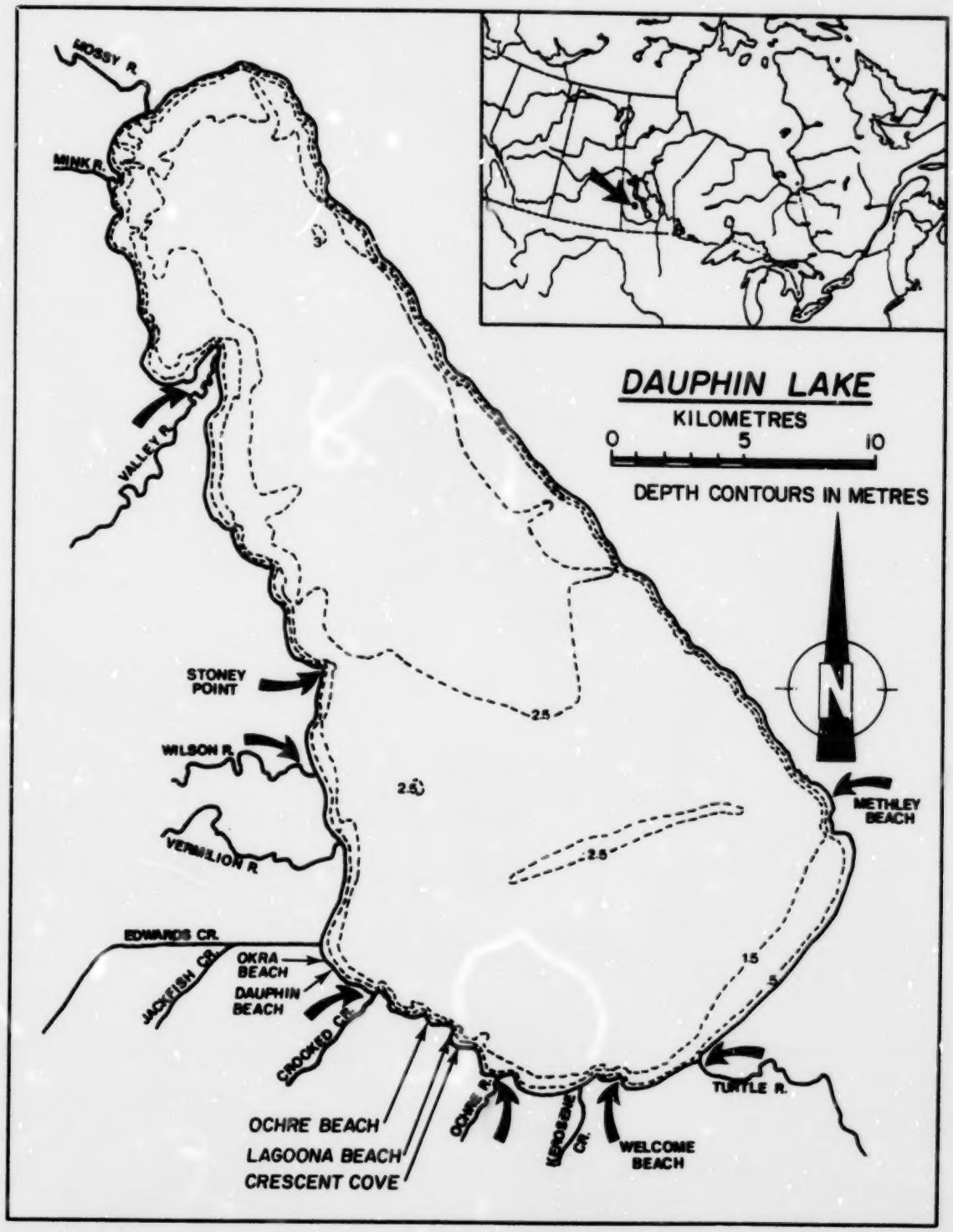

Fig. 1. Map of Dauphin Lake showing angler creel census and cottage residents' angling survey locations.

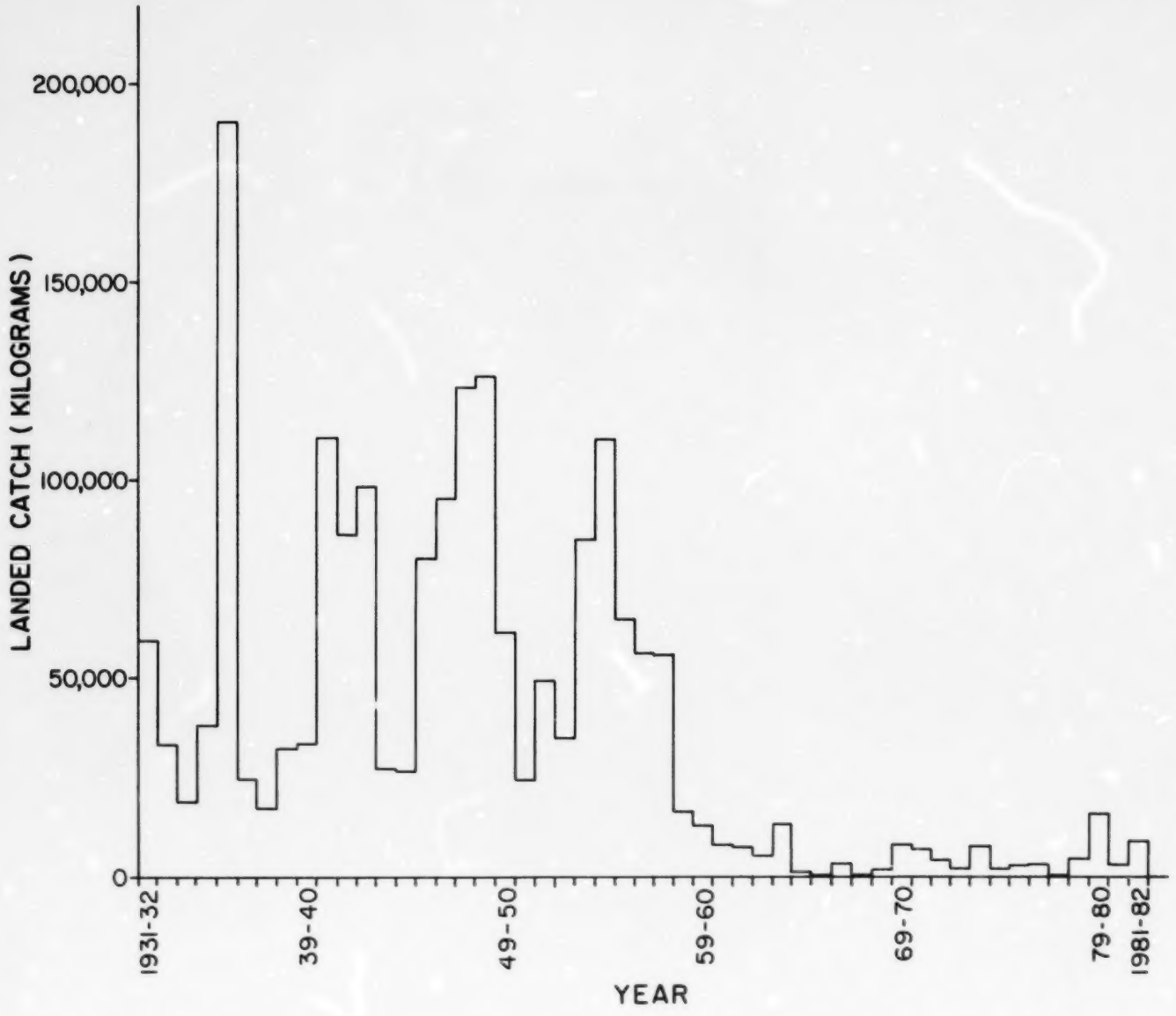

Fig. 2. Commercial walleye harvest from Dauphin Lake, 1931-1982.

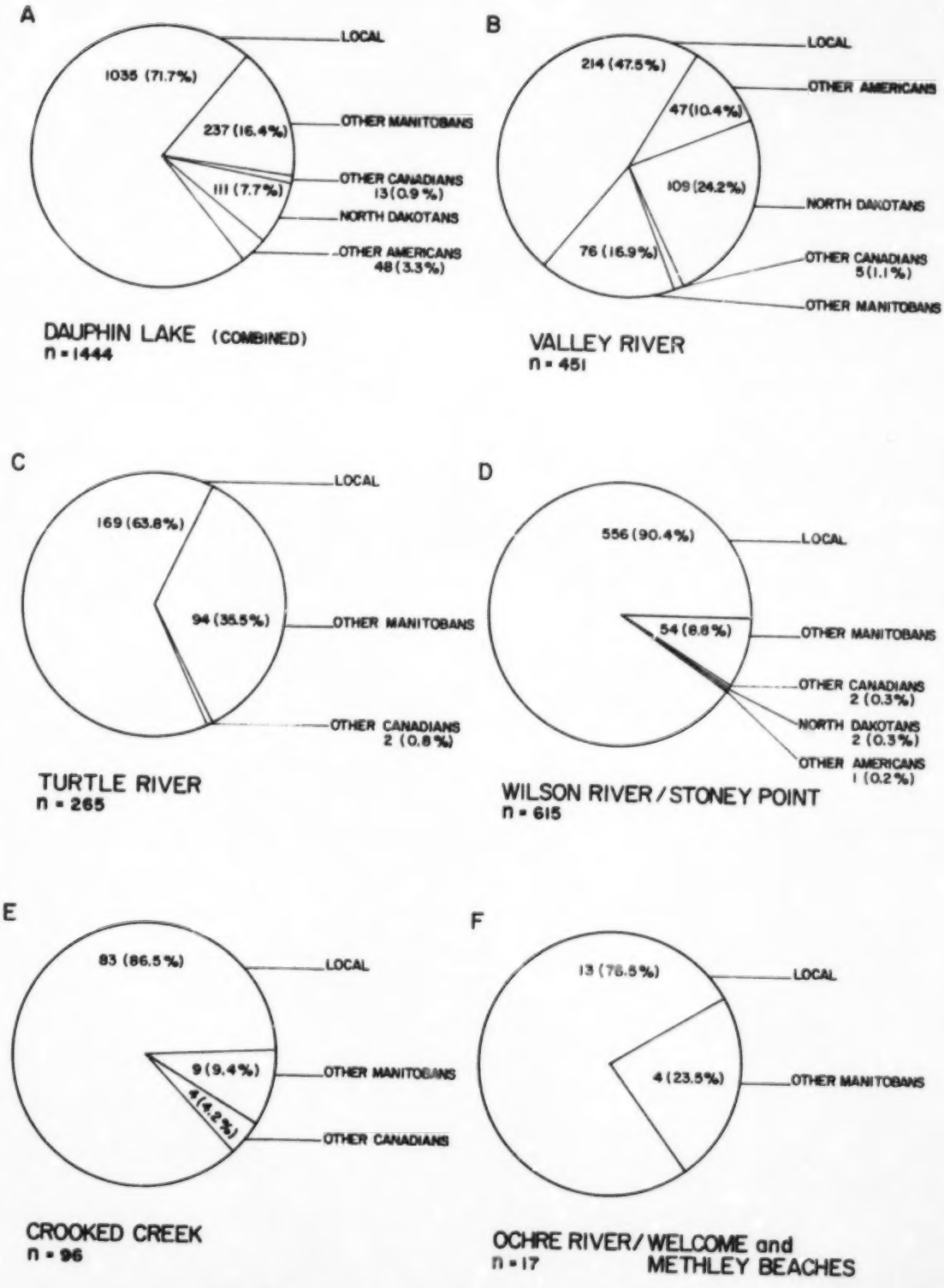

Fig. 3. Places of residence and numbers of anglers interviewed, Dauphin Lake, 1982.

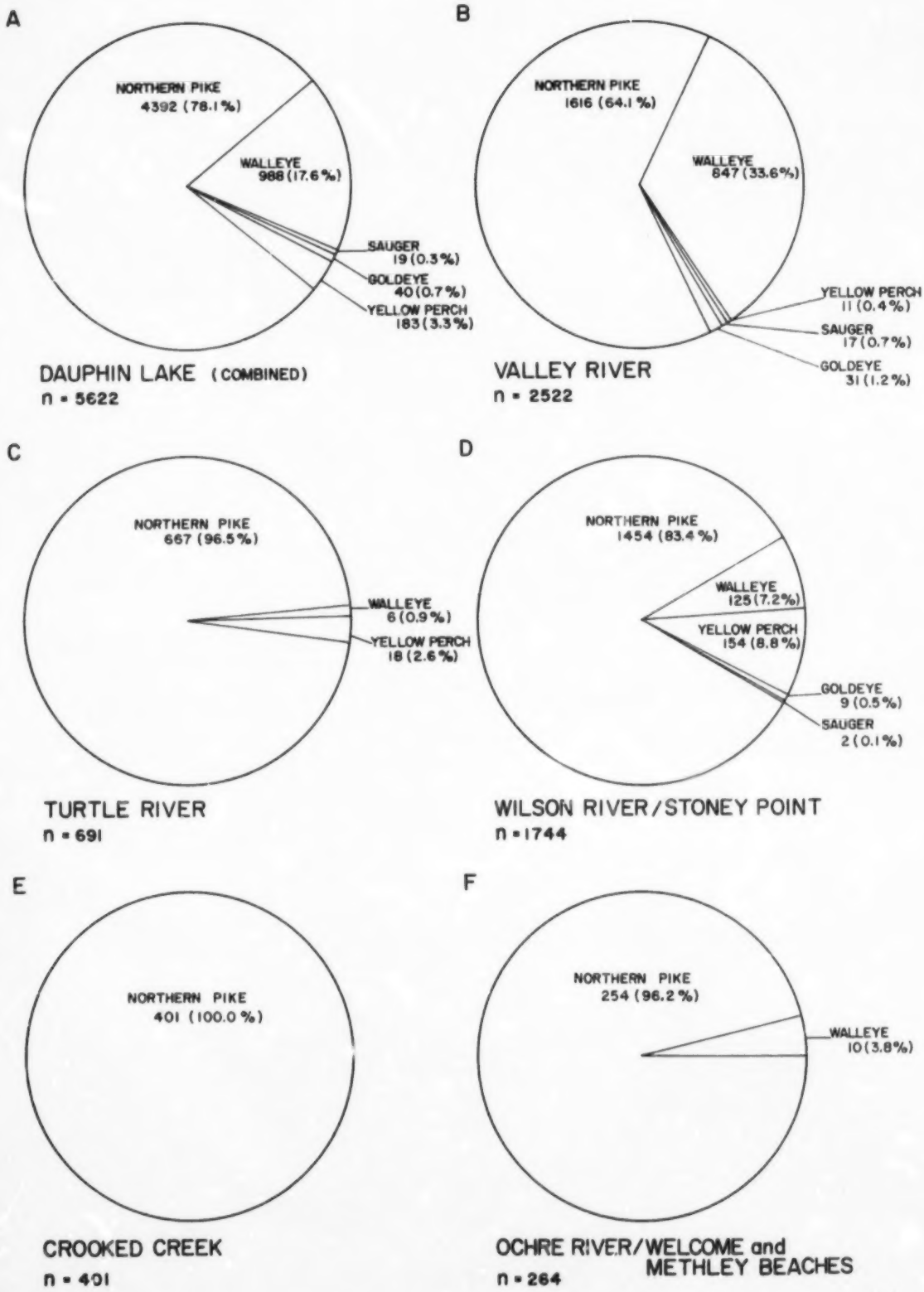

Fig. 4. Species composition of angled catch, Dauphin Lake, 1982.

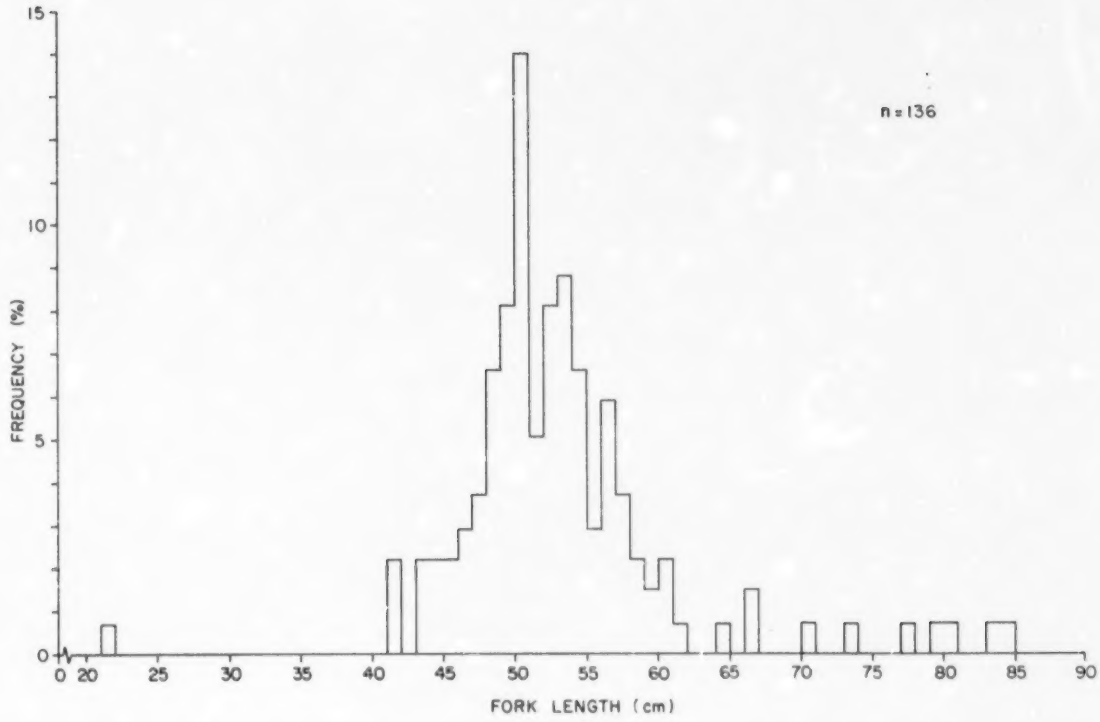

Fig. 5. Length frequency distribution of angled northern pike from Wilson River/Stoney Point creel census location, 1982.

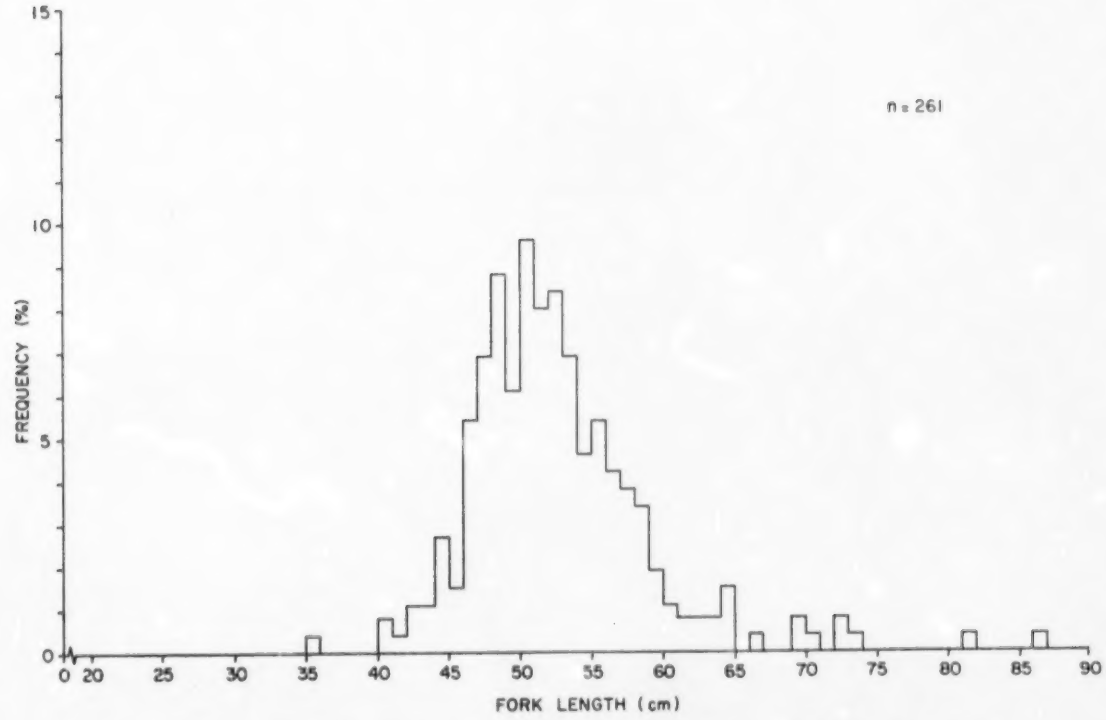

Fig. 6. Length frequency distribution of angled northern pike from Valley River creel census location, 1982.

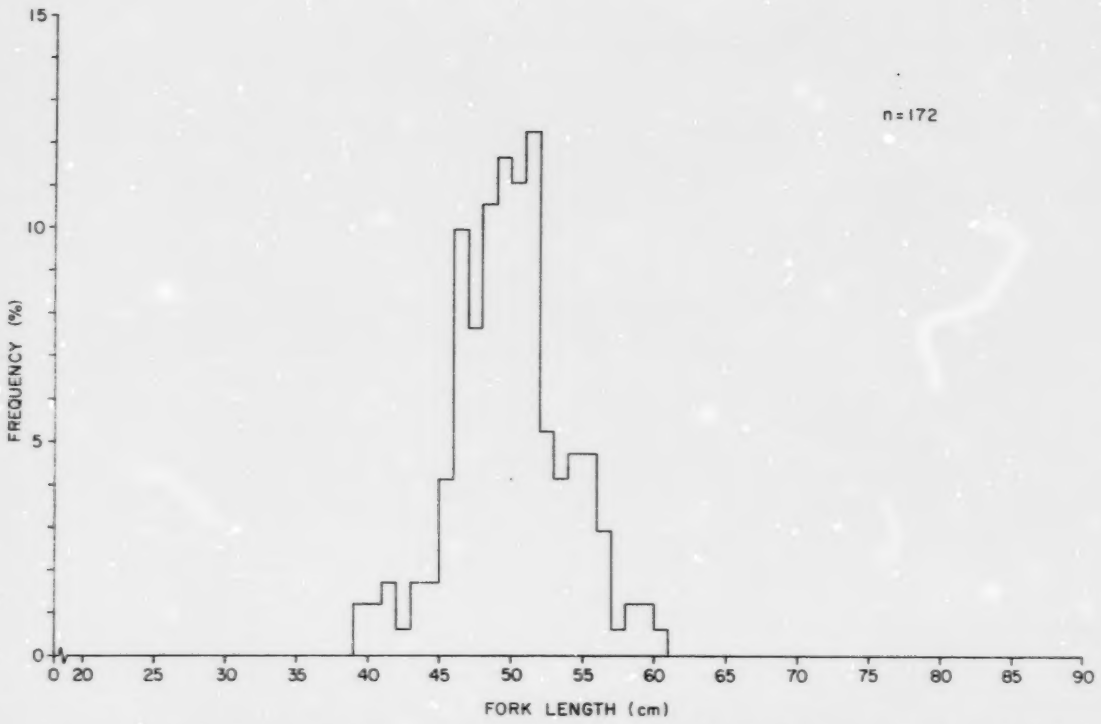

Fig. 7. Length frequency distribution of angled northern pike from Turtle River creel census location, 1982.

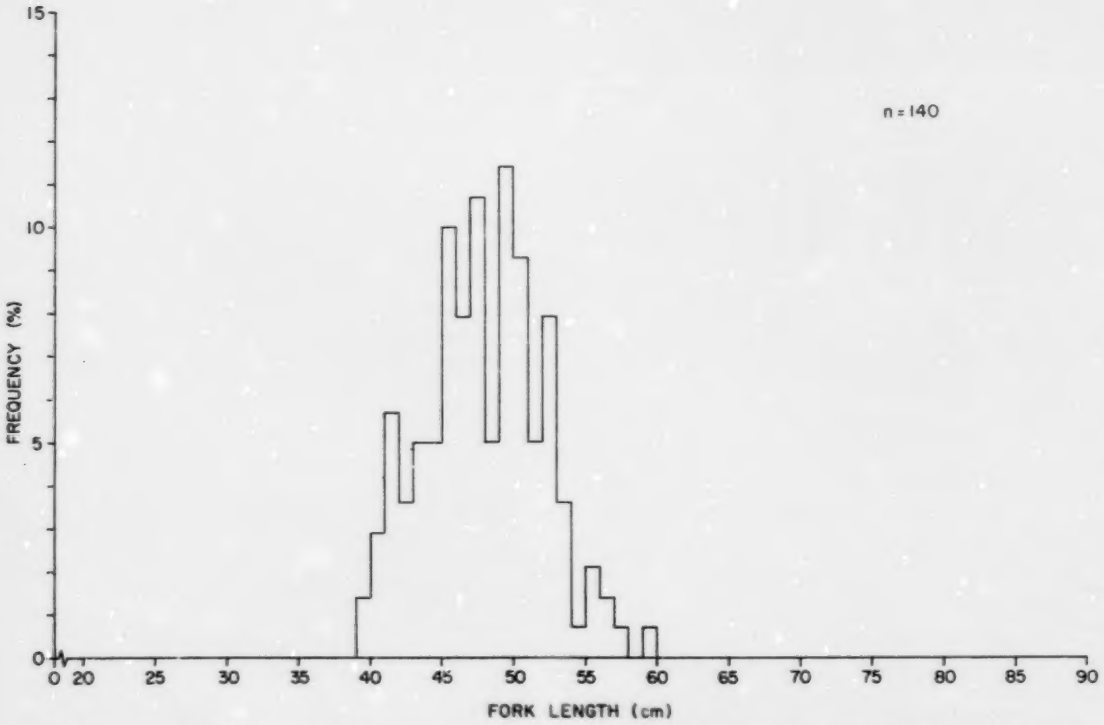

Fig. 8. Length frequency distribution of angled northern pike from Crooked Creek creel census location, 1982.

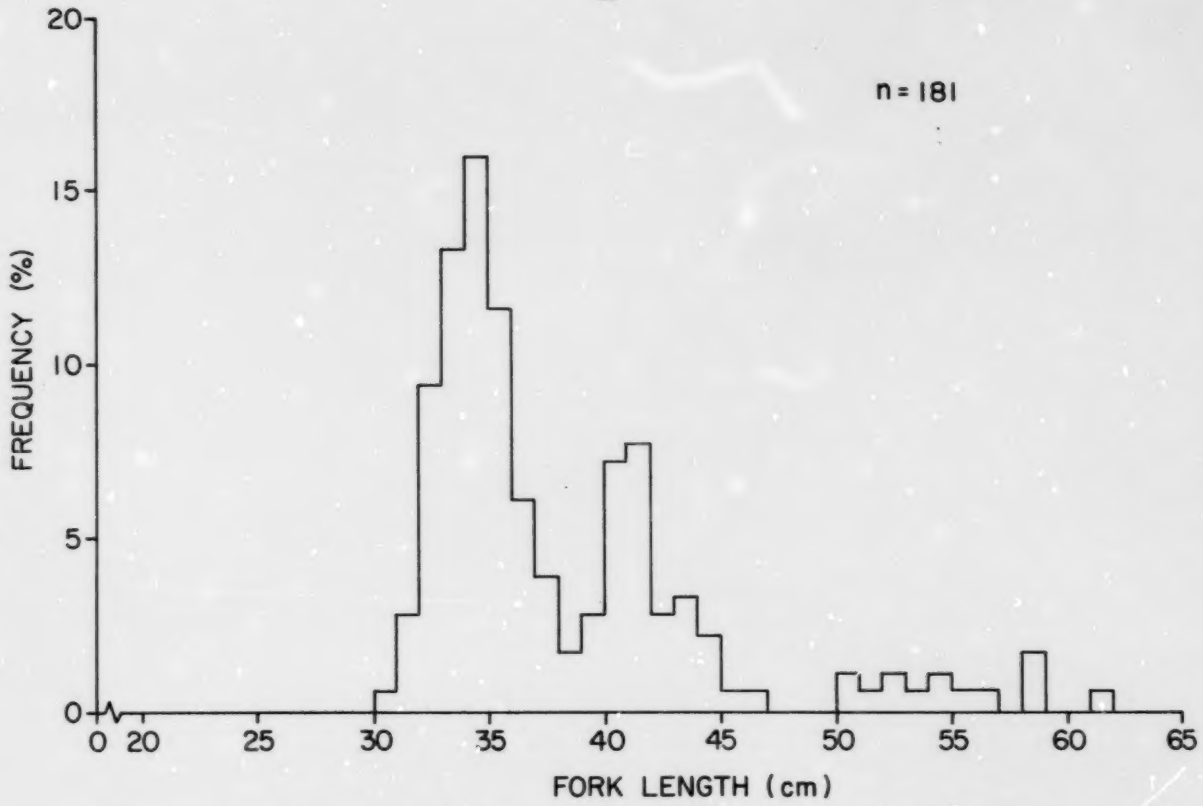

Fig. 9. Length frequency distribution of angled walleye from Valley River creel census location, 1982.

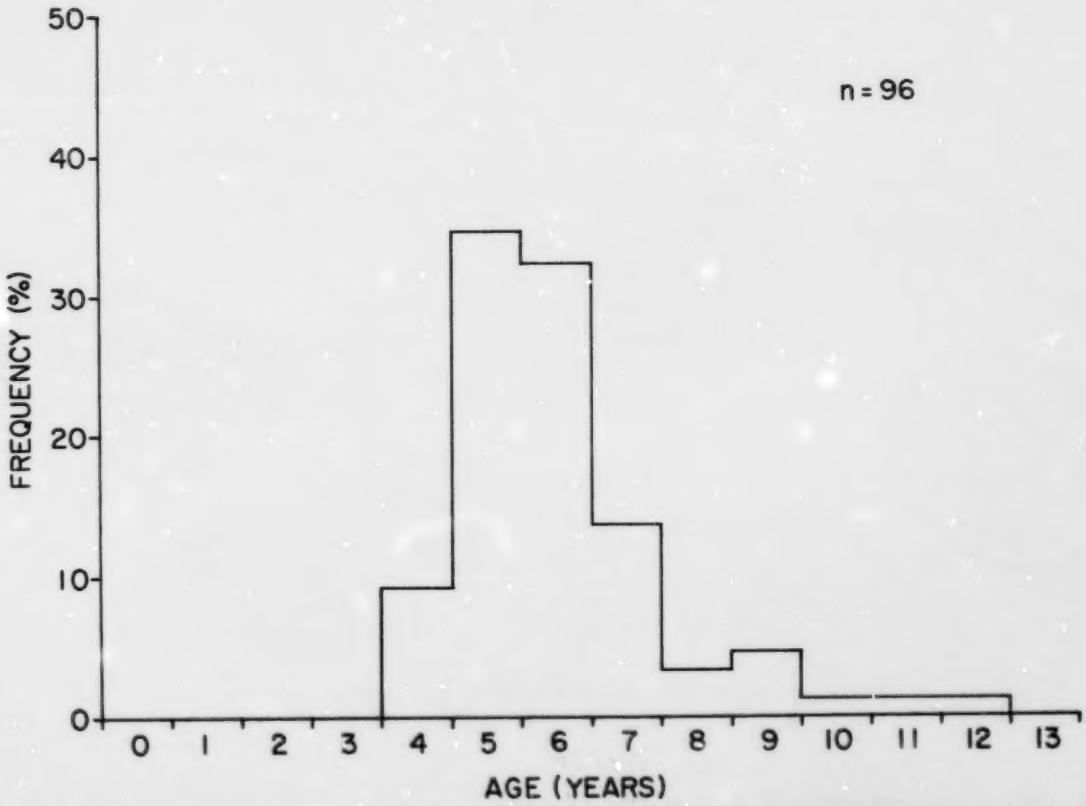

Fig. 10. Age frequency distribution of angled northern pike from Wilson River/Stoney Point creel census location, 1982.

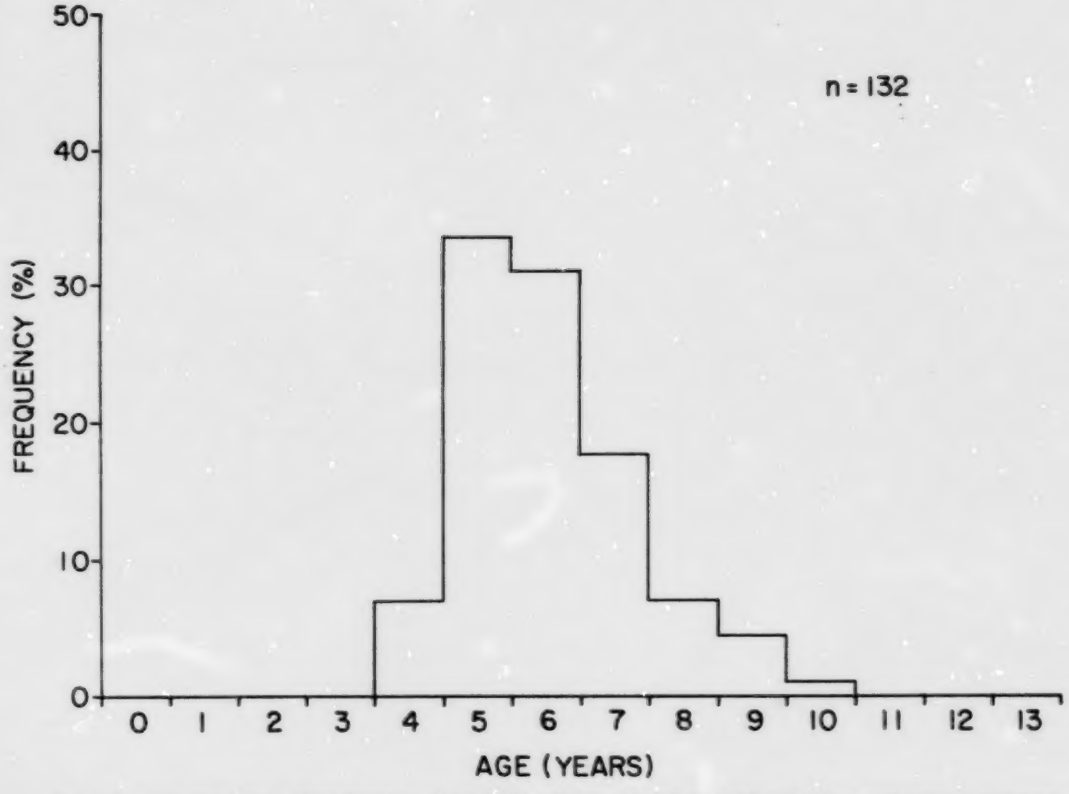

Fig. 11. Age frequency distribution of angled northern pike from Valley River creel census location, 1982.

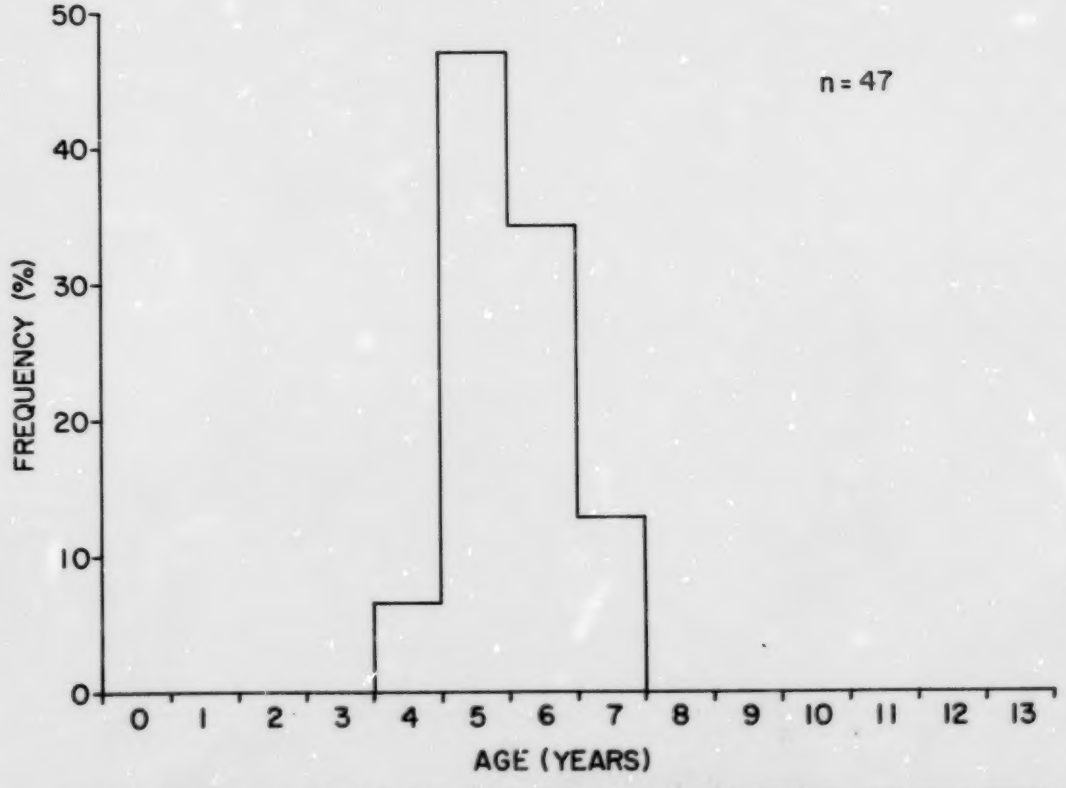

Fig. 12. Age frequency distribution of angled northern pike from Turtle River creel census location, 1982.

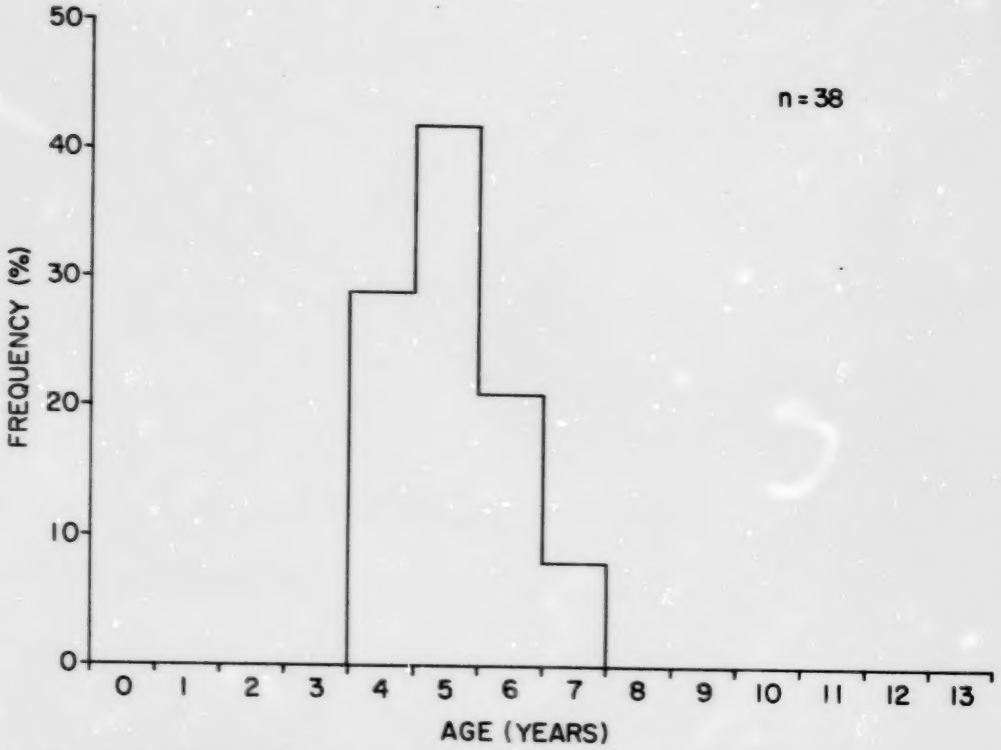

Fig. 13. Age frequency distribution of angled northern pike from Crooked Creek creel census location, 1982.

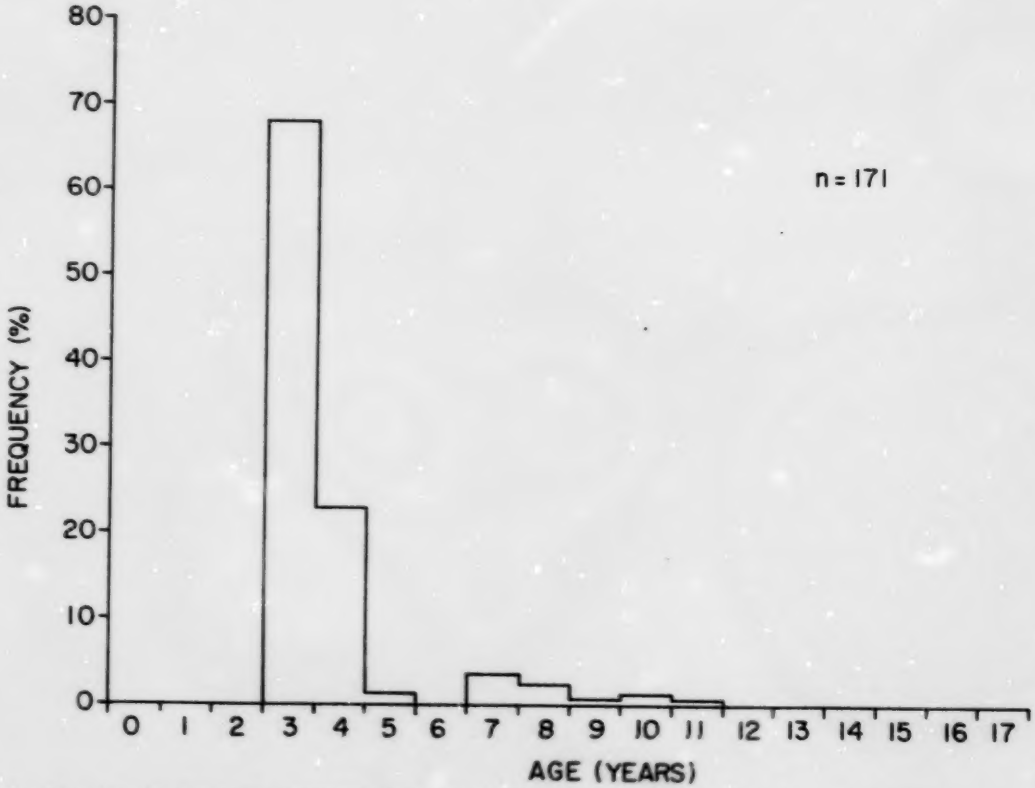

Fig. 14. Age frequency distribution of angled walleye from Valley River creel census location, 1982.